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Superfund: Looking Back, Looking Ahead

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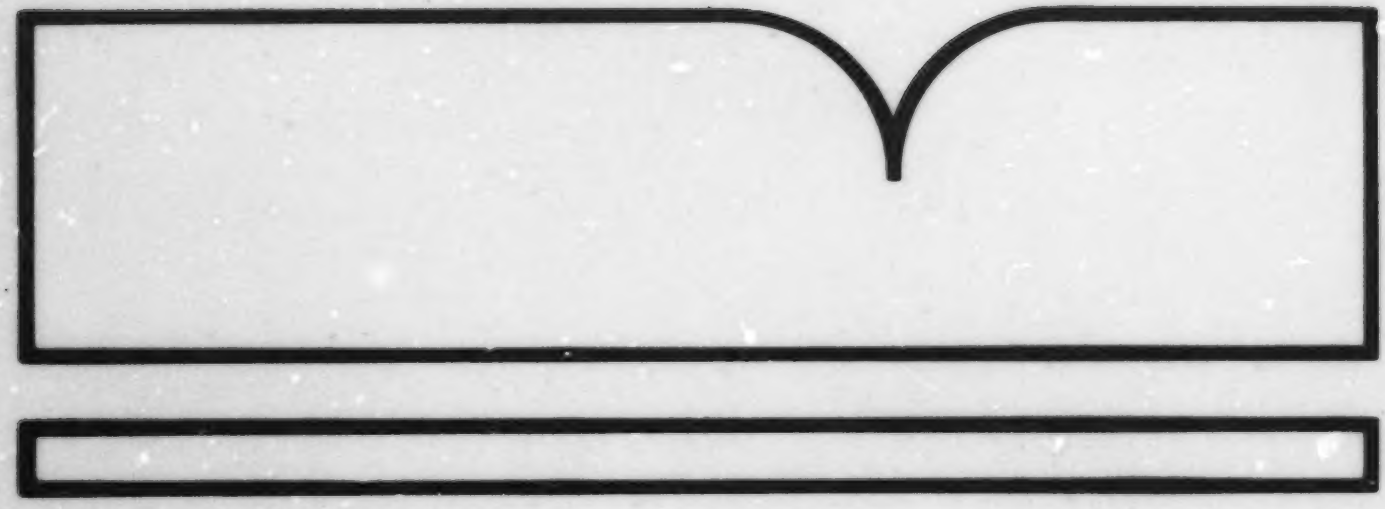

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Superfund: Looking Back, Looking Ahead

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The Birth of A Program

The Problem

The dimensions of the hazardous waste problem are so vast they are almost impossible to comprehend.

There are 240,000,000 people in the United States. Try to imagine a ton of hazardous waste piled next to each of them, with another ton added each and every year.

Hazardous waste is produced in this country at the rate of 700,000 tons per day. That's 250 million tons per year—enough to fill the Superdome in New Orleans 1500 times over.

Yet vast though it is, hazardous waste is only a small fraction of all waste generated in the United States. More than six billion tons of waste are produced in this country every year. Industrial waste, the type most likely to include hazardous substances subject to EPA regulation, represents only 6.4 percent of total waste volume.

The other 93.6 percent (see graph) consists mainly of agricultural and mining waste, with a small share left over for municipal and utility waste.

It should be emphasized that one extremely hazardous form of waste excluded from this graph—high-level radioactive waste—is regulated not by EPA, but by the Nuclear Regulatory Commission and the Department of Energy.

The wastes at Superfund sites consist primarily of industrial chemicals, each posing different threats to the environment and to human health. In most cases, these chemicals wound up at the sites as a result of slipshod disposal practices. For example, as recently as a decade ago, dumping was widespread, even among reputable companies. Little thought was given to the long-term consequences of such behavior.

Today we are paying the price for years of thoughtless neglect. Thousands of abandoned or inactive sites containing hazardous waste have been identified nationwide. Many of these sites are located in environmentally sensitive areas, such as floodplains or wetlands. Rain and melting snow seep through the sites, carrying chemicals that contaminate underground waters and nearby streams and lakes.

At some sites, the air is also contaminated as toxic vapors rise from evaporating liquid wastes or from uncontrolled chemical reactions. And some pollutants, such as metals and organic solvents, are known to damage vegetation, endanger wildlife, and threaten the health of people who unknowingly drink contaminated waters.

Most Superfund sites were created by the chemical and petroleum industries. Others were once municipal landfills that may have become hazardous simply as a result of accumulated pesticides, cleaning solvents, and other chemical products discarded in the household trash. Many sites are the result of transportation spills or other accidents, and others are the final resting place of persistent toxic pollutants contained in industrial wastewater discharges or air pollution emissions.

Whatever their source, it is the responsibility of Superfund to ensure that the hazardous substances abandoned at the worst of these sites do not imperil human health or the environment. It is a truly massive undertaking, and one of great importance to the future of the United States.

Growing Awareness

Hazardous waste is one of those problems that "snowballs." It started off a minimal concern on the extreme periphery of public consciousness. In the space of only a decade, however, hazardous waste rapidly became a central concern of citizens in every part of the United States.

A series of headline-grabbing stories in the late 1970s gave Americans a crash course in the perils of ignoring hazardous waste. First there was Love Canal, the community in Niagara, NY, that had to be evacuated after hazardous waste buried over a 25-year period contaminated ground water.

Then the Valley of the Drums took center stage. This noxious deposit of leaking storage barrels quickly became one of the most notorious places not just in Kentucky but in the United States.

The little community of Times Beach, MO, became the next national hazardous waste story. Oil contaminated with highly toxic dioxin tainted the soil and the water in this eastern Missouri community.

In all these instances, lives were disrupted, property values were ruined: Suddenly Americans began to wonder who would be next . . . and who would be there to pick up the pieces.

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13. Abstract: The article provides an overview of the Superfund hazardous wastes cleanup process and key aspects of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This document also addresses the quest for alternative technologies; emergency planning and community right-to-know;the Leaking Underground Storage Tank Trust Fund (LUST); State involvement; and challenges for Superfund for the future.

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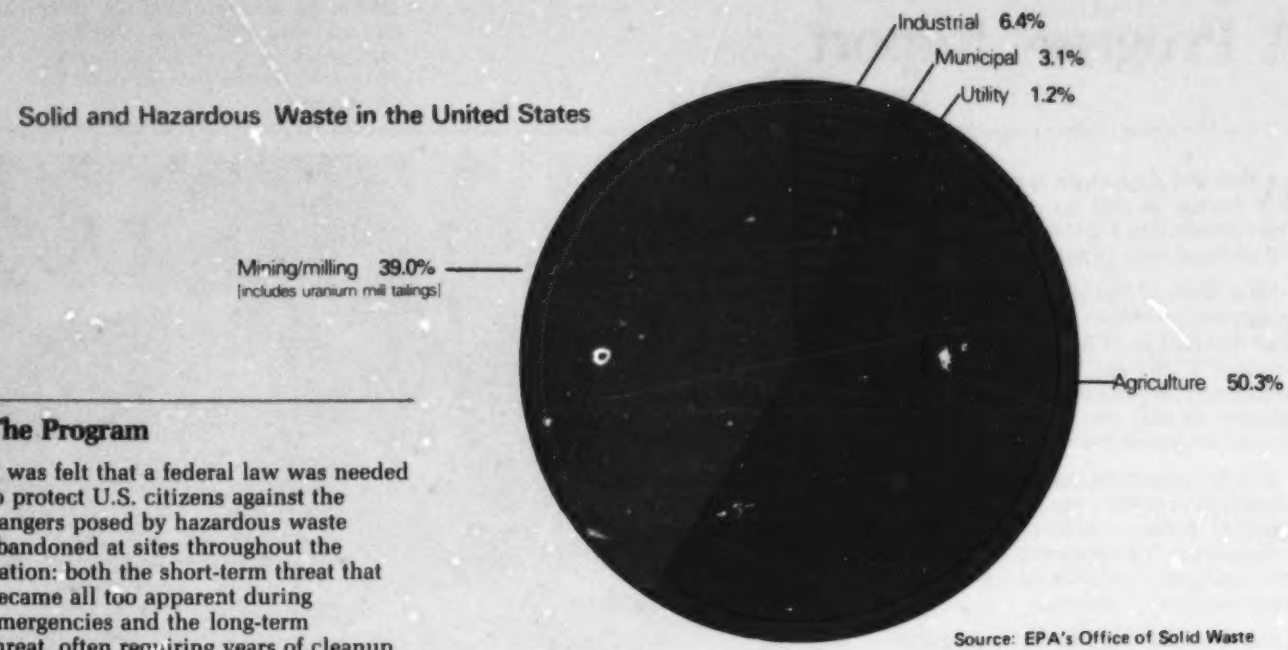


Source: EPA's Office of Solid Waste
(Excludes high-level radioactive waste)

The Program

It was felt that a federal law was needed to protect U.S. citizens against the dangers posed by hazardous waste abandoned at sites throughout the nation: both the short-term threat that became all too apparent during emergencies and the long-term threat, often requiring years of cleanup action.

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) was the first major response to the problem on a national level. CERCLA had several key objectives:

- To develop a comprehensive program to set priorities for cleaning up the worst existing hazardous waste sites.
- To make responsible parties pay for those cleanups wherever possible.
- To set up a $1.6 billion Hazardous Waste Trust Fund—popularly known as "Superfund"—for the twofold purpose of performing remedial cleanups in cases where responsible parties could not be held accountable, and responding to emergency situations involving hazardous substances.
- To advance scientific and technological capabilities in all aspects of hazardous waste management, treatment, and disposal.

Superfund was to be funded with taxes on crude oil and 42 different commercial chemicals. State governments were to pay 10 percent of the cost of Superfund work at privately owned sites and 50 percent at those that were publicly owned.

The United States seemed ill-prepared to deal with the problem of hazardous waste prior to the creation of Superfund. Nevertheless, CERCLA did not develop out of a complete vacuum.

In the Clean Water Act of 1972, Congress had provided for the regulation of hazardous waste discharged into all navigable waters of the United States. A $35 million trust fund—an ancestor of Superfund—was set up to deal with problems stemming from such discharges. However, no provision was made to deal with damage to land resources resulting from contamination by hazardous waste.

One important offshoot of the 1972 Clean Water Act was the formulation of a National Contingency Plan for dealing with emergencies involving hazardous waste. This plan has undergone many refinements through the years, and it is still the guiding principle behind the implementation of Superfund.

Passage of the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) marked two more milestones in the evolution of an active governmental response to the hazardous waste crisis. Both these statutes brought important changes to the day-to-day operations of the U.S. chemical industry.

TSCA gave EPA the task of identifying and controlling chemical products that pose an unreasonable risk to human health or the environment through their manufacture, processing, commercial distribution, use, or disposal.

While the mission of Superfund was to clean up the mistakes of the past and cope with the emergencies of the present, RCRA was designed to create guidelines for prudent hazardous waste management and disposal in the present and the future. It was to provide the United States with its first tracking system for regulation of hazardous waste from generation to disposal. If fully successful, RCRA should someday eliminate the need for a Superfund program. □

"Superfund: Looking Back, Looking Ahead" first appeared as a special section in the January/February 1987 issue of the EPA Journal. *Jack Lewis of EPA's Office of Public Affairs edited the section. Special thanks are owed to Susan Bullard of the Office of Solid Waste and Emergency Response, as well as these other EPA employees who made valuable contributions to the section: At headquarters/ Sylvia Malm; Debbie Wood; Don White; June Taylor; Rita Calvan. In Region 3/Nanci Sinclair; In Region 5/Margaret McCue and John Tanaka. The Journal also thanks Robert Costa of Geo-Resource Consultants and Jack Macy of Massachusetts' Department of Environmental Quality Engineering.*

Superfund's First Six Years: A Progress Report

Steve Delaney

Removing contaminated soil from a site in Calverton, MD. More than 700 emergency removal actions were completed in the first six years of Superfund.

What did Superfund accomplish during the first six years? The following had taken place by the end of fiscal year 1986:

- More than 25,000 potentially dangerous hazardous waste sites had been reported to EPA. Of these, in excess of 20,000 had been given a preliminary assessment by EPA or state agencies. In only one case out of three has further action been necessary.
- Site investigations had been completed at 6,484 sites identified as potential threats to human health or the environment. Information from these investigations is used to set national priorities for site cleanups.
- 888 sites had been listed or proposed for listing on the National Priorities List (NPL). These sites, presenting the most serious potential threats to health and the environment, are eligible for cleanup using the federal Superfund. (The number of NPL sites increased in January 1987 to a new level of 952.)
- Detailed investigation and planning for remedial action had begun at 473 NPL sites.
- Design of remedial cleanups scheduled for implementation had been funded at 110 NPL sites and 12 non-NPL sites.
- Fourteen sites had been removed from the National Priorities List as a result of actions completed by EPA, the states, and responsible parties. (Completion of cleanups has proved more difficult and more time-consuming than anyone at first imagined; this has been particularly true of NPL sites, which rank as the worst in the nation. It has been estimated that EPA-managed cleanups under the Superfund program require an average of 5.54 calendar years from start to finish. Completions will be more frequent in years to come as work proceeds at sites where preliminary cleanup stages have already been completed.)
- Another 156 cleanups are currently in progress. Implementation of cleanup remedies has been funded at 137 NPL sites and 19 non-NPL sites. These sites are in what is known as the "construction phase" of cleanup. This expression derives from the fact that remedial actions involve various engineering activities, such as pumping and treating ground water, capping with waterproof clay, and installing drains or liners.
- In addition to remedial cleanups, Superfund provides for emergency actions to deal with short-term threats to human health and the environment. As of September 30, 1986, emergency removal actions had been completed at 716 sites by EPA or the U.S. Coast Guard, which enforces CERCLA in coastal waters and inland waterways. (By January 1987, that number had risen to 728.)

CERCLA's enforcement provisions call for the identification and notification, wherever possible, of the parties responsible for creating hazardous waste sites that require removal or remedial action. As of September 30, 1986:

- EPA had reached settlement agreements with responsible parties at 372 sites, resulting in the payment of $619 million in actual cleanup expenditures by responsible parties. In addition, EPA had recovered $37 million in compensation to Superfund for cleanups performed by EPA. This $656 million in enforcement-recovered assets expanded Superfund resources by 40 percent during its first six years of operation.
- EPA and the Department of Justice had taken civil action at 91 sites to prompt remedial action by potentially responsible parties.
- EPA had issued 408 administrative orders against potentially responsible parties compelling them to take various forms of action to deal with problem hazardous waste sites.

Other, less readily quantifiable achievements of Superfund's first six years include:

- Development of a national infrastructure capable of dealing with scientific and technological problems related to hazardous waste.
- Development of improved scientific and engineering techniques for treating and disposing of hazardous waste.
- Improved understanding of the health effects associated with various levels of exposure to different hazardous substances.
- Expanded and improved laboratory capacity nationwide for handling the vast number of samples that need to be analyzed as part of Superfund site assessments and investigations.
- Development of a streamlined management system within EPA for dealing with the demands of the increasingly complex and heavily funded Superfund program.
- Establishment of an aggressive Community Relations Program, which has not only kept the public informed of activity at Superfund sites, but sought community input into the formulation of decisions and plans for remedial action. □

Steps In Cleaning Up A Superfund Site

National Response Center

Many Superfund cases begin here at the National Response Center, where U.S. Coast Guard officers receive reports over a toll-free line of oil spills and hazardous substance releases.

1. The Initial Warning

Individuals report concerns about abandoned hazardous waste sites or incidents of illegal dumping to EPA's National Response Center (800/424-8802) or to a local, state, or federal government official.

What circumstances could prompt a report? It could be a citizen phoning to report the presence of half-buried barrels of hazardous waste in his neighborhood. Or it could be a local law enforcement official who had spotted a midnight dumper. Or it could simply be a facility manager making a formal report to EPA.

In 1980, it was estimated that the United States had roughly 9000 problem hazardous waste sites. A mere six years later, over 25,000 suspected sites had been entered into CERCLIS—EPA's computerized data base. In 1986 alone, EPA and the Coast Guard received 2700 notifications of releases from a variety of different sources. It is currently projected that as many as 2500 of these sites will require cleanup under the federal Superfund program.

2. Identification and Preliminary Assessment

Once EPA learns of a possible hazardous site, it collects all available background information not only from its own files but also from state and local records and U.S. Geological Survey maps. This information is used to identify the site and perform a preliminary assessment of its potential hazards. EPA tries to determine the size of the site, the identity of the parties most likely to have disposed wastes there, the types and quantities of wastes most likely to have been disposed, local hydrological and meteorological conditions, and the impact of these on the environment.

3. Site Inspection

If a preliminary assessment turns up evidence that the site may pose a threat to human health or the environment, inspectors actually go to the site to collect sufficient information to rank its hazard potential.

Site inspectors look first for obvious signs of danger: leaking storage drums, dead or discolored vegetation, etc. They may, if circumstances warrant, take samples of nearby soil or water. They also analyze ways hazardous materials from the site could be polluting environmental resources (for example, through run-off into nearby streams) and check to see if children have access to the site.

4. Ranking Sites for the National Priorities List

The National Priorities List (NPL) identifies the targets for long-term remedial action under Superfund. Updated at least once a year, the NPL identifies the worst abandoned or uncontrolled hazardous waste sites in the United States according to a variety of factors, including the type, quantities, and toxicity of the wastes involved; the number of people potentially exposed; the likely pathways of exposure; and the importance and vulnerability of the underlying supply of ground water.

As of January 1987, 951 sites had either been listed (703) on the NPL or proposed for listing (248).

5. Remedial Investigation

The ultimate objective for hazardous waste sites on the NPL is a permanent, long-term cleanup. NPL sites are subjected to a "remedial investigation" in order to select the cleanup strategy best suited to the traits of each site.

A remedial investigation can best be described as a carefully designed field study. Conducting a remedial investigation entails extensive sampling and laboratory analyses. These generate more precise data on the types and quantities of wastes at the site, the soil type and water drainage patterns, and resulting environmental or health threats.

6. Feasibility Study and Cleanup

Cleanup actions have to be tailored exactly to the needs of each individual site. The feasibility study analyzes those needs, and evaluates alternative cleanup approaches on the basis of their relative effectiveness and cost. A Record of Decision is issued setting forth the selected remedy based on these factors.

7. Removal Actions

EPA may initiate short-term removal actions any time a site is found to present an imminent hazard as a result of its potential for fire or explosion or its contamination of a drinking water supply. Removal actions range from installing security fencing to actually digging up and removing wastes for safe disposal. Such actions may be taken at any site, not just those on the NPL. □

Anatomy of a Superfund Remedial Action

In a Superfund remedial action, EPA undertakes a long-term effort to provide a permanent remedy to an environmental problem that poses a serious, but not immediate, danger to the public. Remedial cleanup at a hazardous waste site can go on for many years. It takes complex engineering analysis and design work to produce solutions that work and that also meet legal requirements. EPA Administrator Lee Thomas has said that "the majority of sites on the National Priorities List will not come off for five to 10 years. There are many sites on the list that will never come off because we will monitor them in perpetuity to make sure that cleanup is permanently effective."

The following article describes how events have unfolded at one of the sites currently listed on EPA's National Priorities List for remedial action: the Verona Well Field in Battle Creek, MI.

The Verona Well Field presents problems too complex for any quick fix solutions. For four years, EPA has been working to clean up contaminated ground water at this site in Battle Creek, MI, but persistent problems remain.

The problems began in 1981. In the process of conducting routine tests, the Calhoun County Health Department discovered slight contamination of drinking water by volatile organic compounds, or VOCs. The water was coming from the 100-acre Verona Well Field, where a total of 30 city wells supplied water to 35,000 Battle Creek residents and many businesses.

Follow-up testing by both the county and state health departments showed that 10 of the 30 wells, as well as 80 nearby private wells, contained detectable levels of VOCs. Some of the VOCs detected—trichloroethylene; tetrachloroethylene; 1,2 dichloroethane; 1,1,1 trichloroethane; and 1,1 dichloroethylene—were suspected human carcinogens.

Could the contaminated wells be cleaned? Could the non-contaminated wells be preserved? Where was the contamination coming from? Could it be controlled? Each question led to another, as EPA's work at the Verona Well Field site became a combination of detective work, laboratory study, engineering feats, and construction innovations.

In July 1982, the Verona Well Field was included on the National Priorities List, making it eligible under Superfund for long-term remedial investigation and cleanup money. EPA took its first action at the site in October 1983, at the request of Michigan's state government.

To meet the immediate threat to drinking water quality, EPA used Superfund emergency response money to provide bottled water to residents with contaminated wells. At the same time, an EPA Technical Assistance Team began a preliminary ground-water survey to pinpoint the extent and sources of the contamination. Any number of facilities in the commercial/industrial area could have been potential sources.

In November 1983, building on the results of the preliminary survey, EPA launched an in-depth investigation, installing monitoring wells in and around the well field to measure the types and concentrations of contaminants in the ground water. It took many months to drill the dozens of wells that were required for adequate measurements. And, since ground-water flow fluctuates throughout the year, it took more months to collect samples in different seasons, and then analyze each for almost 200 different contaminants.

In December 1983, the State of Michigan finished constructing a system to supply city water to all homes in the area. Residents who had been depending on private wells, and then on bottled water, were now hooked up to city wells. But by January 1984, 24 of the city's 30 wells had become contaminated, and it was apparent that the city would not have enough clean water to meet peak demand in the coming summer.

To resolve the city's water supply problem, EPA began using certain existing wells as barrier wells, to stem the flow of contamination to still-clean wells further north. Water from the barrier wells was pumped and purged. Since the barrier wells were started up in May 1984, the spread of contamination has been halted.

Next the Agency set up an air stripping and carbon adsorption system to clean well water that had already been contaminated. In this system, contaminated water is pumped from the wells to the top of the air stripping tower. Then the water cascades down through a large tube, while a high-powered fan actually blows the contaminants out of the water and into the air. The fan then sucks the contaminated air out of the tower and forces it through tanks containing activated carbon. The contaminants cling to the carbon. The system discharges clean, treated air into the atmosphere, and clean, treated water into the Battle Creek River. Since the system became fully operational in August 1984, 16 of the city's contaminated wells have been restored.

In the summer of 1984, EPA also installed three new water supply wells. These new wells, coupled with the air stripping and carbon adsorption system and the barrier wells, effectively solved Battle Creek's water supply problem. But another problem remained: identifying and cleaning up the sources of contamination.

By July 1984, EPA had progressed far enough in its investigation to be able to pinpoint one major source: a Thomas Solvent Co. facility on Raymond Road, one mile from the Verona Well Field. Concentrations of VOCs in ground water under and around the facility were 100 times higher than in the rest of the ground-water plume, and the soil around the facility was also heavily contaminated. The Agency installed monitoring wells at Thomas Solvent to determine the extent of contamination.

The cost of a hazardous waste cleanup should, whenever possible, be paid by the parties responsible for the contamination. But in the Verona Well Field case, Thomas Solvent had declared bankruptcy and ceased operations in April 1984. EPA, one of four major claimants against the company's assets, decided not to wait for the resolution of the bankruptcy case. In August 1985, relying on input garnered from an engineering evaluation and public comments, the Agency decided on a cleanup alternative at the Raymond Road facility, site of the most serious contamination.

Pumps for air stripping system to clean ground water at the Verona Well Field in Michigan are housed in a dry well constructed about 10 feet below ground.

The best method for cleaning up contaminated ground water at the site, EPA decided, was to extract it via wells, and then pipe it one mile to the well field for treatment in the air stripping/carbon adsorption system. Engineering blueprints and construction details were ironed out. With a dearth of Superfund money in 1986, the State of Michigan advanced EPA some $2.5 million so construction could begin. The system should be ready to go on line by June 1987. It will take about three to five years to remove most of the contaminants from the ground water.

Since the soil contains contaminants which can eventually enter ground water, soil cleanup at the site will also be necessary. Several extraction wells will be placed in the soil, and connected by a vacuum pump. The vacuum will pull VOCs out of the soil and send them to a carbon adsorption system for treatment. Because of the innovative nature of this treatment system, much of the design detail awaits finalization by the contractor who will win the bidding process. Once in place, the vacuum process is expected to take from six months to a year to reduce contaminants in the soil down to the established cleanup level.

Meantime, EPA continues its investigations into other sources of contamination at the Verona Well Field. It has installed more monitoring wells at a Thomas Solvent annex and at a railroad yard east of the well field which was identified as another possible source of VOC contamination.

The work at Verona Well Field has turned out to be more complicated than first expected. In late 1986, the bankruptcy case was settled, and EPA will get a portion of the "bankruptcy estate." That amount, however, is far less than the amount of money EPA has spent, so the Agency must continue its cost recovery actions against other parties. A quick fix to the problem of the contaminated wells — bottled water — was not enough. New remedies had to be devised, and new remedies for other sources still have to be designed, constructed, and operated until cleanup levels are achieved. EPA repeatedly has had to expand its work, dig some more, and seek new solutions to unique problems. □

Anatomy of a Superfund Emergency Response

EPA has emergency response authorities under the Comprehensive Emergency Response, Compensation, and Liability Act of 1980. CERCLA authorizes EPA to intervene when hazardous wastes present an imminent hazard of explosion, air or water pollution, etc., that would pose an immediate short-term threat to human health.

In many cases, emergency responses involve removing contaminants from the problem site and transporting them to waste disposal sites in compliance with the Resource Conservation and Recovery Act. Hence, they are usually called "removal actions." Whatever actions are taken, their purpose is to "remove" the threat in whatever way possible.

The cast of characters in a Superfund removal action can include local, state, and federal officials; private contractors; owners or former owners of a site; concerned citizens who live nearby. No matter how many people are involved, the goal is simple: identify and eliminate the hazard as quickly and as thoroughly as possible.

Until recently, the time limit on a removal action was six months; the Superfund Amendments and Reauthorization Act of 1986 extended the limit to one year. A total of 728 Superfund removal actions had been completed through January 1987.

This is how one response action worked in the town of Lancaster, PA:

Row after row of modest brick homes line North Mary Street in North Lancaster, PA. Several years ago, an abandoned brick warehouse stood virtually unnoticed in the midst of this quiet neighborhood. For 60 years, it had been the site of an electroplating facility owned by C. E. Brubaker, Inc.

Electroplating is an industrial process that uses electrical current to plate one kind of metal with another. It produces hazardous wastes such as cyanide and cadmium as well as acidic and basic solutions.

Brubaker stored these wastes in large open-top vats inside the warehouse. Fumes from the vats mingled with air circulating inside the building. The polluted air was pumped into the neighborhood outside the plant, putting its unsuspecting residents at risk.

After a year of conflict with Pennsylvania's Department of Environmental Resources (PADER) over unsafe handling of hazardous materials, the Brubaker company declared bankruptcy in September 1984 and shut down its old North Mary Street site.

PADER officials then inspected the closed facility and discovered over 14,000 gallons of liquid cyanide as well as acidic and basic solutions. State health experts determined that these leaking vats posed a potential threat to the health of nearby residents.

From December 1984 to the summer of 1985, both PADER and the City of Lancaster negotiated with Brubaker in an effort to get the company to accept responsibility for its abandoned facility. Negotiations failed, however, and it became obvious that any action at Brubaker's Lancaster warehouse would have to be publicly funded. Neither the City of Lancaster nor the State of Pennsylvania had the resources to handle such large quantities of hazardous waste, so in March 1985, PADER and Lancaster City officials made a formal request to EPA for help.

In July, EPA collected samples from seven vats and three drums. Analysis of the samples confirmed Pennsylvania's findings about their contents. EPA further concluded that through vandalism or corrosion, the acids and bases at the Brubaker site could mingle with the liquid cyanide and release deadly cyanide gas.

The Centers for Disease Control (CDC) recommended that the problem substances be removed from the building. To protect residents of the area during the tricky removal period, the CDC further recommended that all residents within 200 yards of the Brubaker facility be evacuated during the cyanide pumping.

On September 10, 1985, EPA announced the impending removal action. The Agency also announced that people in 46 homes and businesses would be approached with a recommendation to evacuate during periods of cyanide pumping. The action, scheduled to begin on October 2, called for the pumping of cyanide liquids out of containers at the site and into drums destined for transfer to a Michigan facility where the cyanide liquids would be detoxified. Acidic solutions would be sent to a waste conversion facility, while floorboards and sludges would go a hazardous waste acceptance facility.

EPA's Region 3, headquartered in Philadelphia, would spearhead the Lancaster operation. The Region 3 team would include an On-Scene Coordinator (OSC) to manage the project and a Community Relations Specialist to handle press and citizen inquiries as well as coordinate with the City of Lancaster. Technical experts from Region 3's Environmental Response Team (ERT) would advise the On-Scene Coordinator on matters related to community health and worker

Technicians sample open vats of cyanide solution at Brubaker site in Lancaster, PA.

protection. The U.S. Coast Guard would develop and implement a safety plan for the site.

Many people assume that EPA officials actually perform Superfund removals and cleanups. This is seldom the case. Federal officials devise the plans for these actions; private contractors execute them. In the case of the Brubaker site, one contractor handled removal and cleanup operations, while another documented site activity and provided technical support.

Once the regional team had assembled, EPA and the CDC turned to Pennsylvania and Lancaster officials for advice and assistance. PADER promised to provide further help during the removal action. City officials offered help in transporting residents to evacuation centers on the three days cyanide pumping would be taking place. They also offered to provide police manpower to patrol the evacuated streets. The local hospital and fire companies were placed on standby in the event that a problem occurred during the removal.

EPA held a press conference to announce the site cleanup, and a public meeting to answer residents' questions concerning the evacuation and the waste removal. To allay remaining fears and confusion, an EPA Community Relations Specialist and representatives of the CDC and the Lancaster Emergency Management Agency went door-to-door down North Mary Street, distributing flyers about the impending operation and fielding questions about its impact on their lives. On October 1, 1985—the day before cyanide pumping began—more flyers were distributed.

The pumping began 8:30 a.m., Wednesday, October 2. Most of the residents were at work by 8:30; others stayed with friends or relatives during the pumping, which was over each day by 1:30 P.M. Local residents were free to occupy their homes or businesses both before and after the actual hours of pumping. Only one family refused to vacate its home during pumping hours, which came to an end on Friday, October 4.

The following weeks involved the removal of acidic bases and solutions, disposal of an underground storage tank, and removal of floorboards and sludges remaining in the building. On December 6, EPA held a final tour of the building for city officials and, five days later, a closeout public meeting.

The removal operation had taken about two months. At a total cost of $472,450, 14,165 gallons of liquid cyanide, acids, and bases, as well as 60 cubic yards of contaminated floor boards and other solid waste, had been removed from the North Mary Street site—and with them, the health and environmental threat posed by the wastes that had been abandoned there.

Lancaster police escorted the final truckload of wastes out of the city on December 20, 1985. Once again, North Mary Street was just another quiet road in Lancaster, PA. □

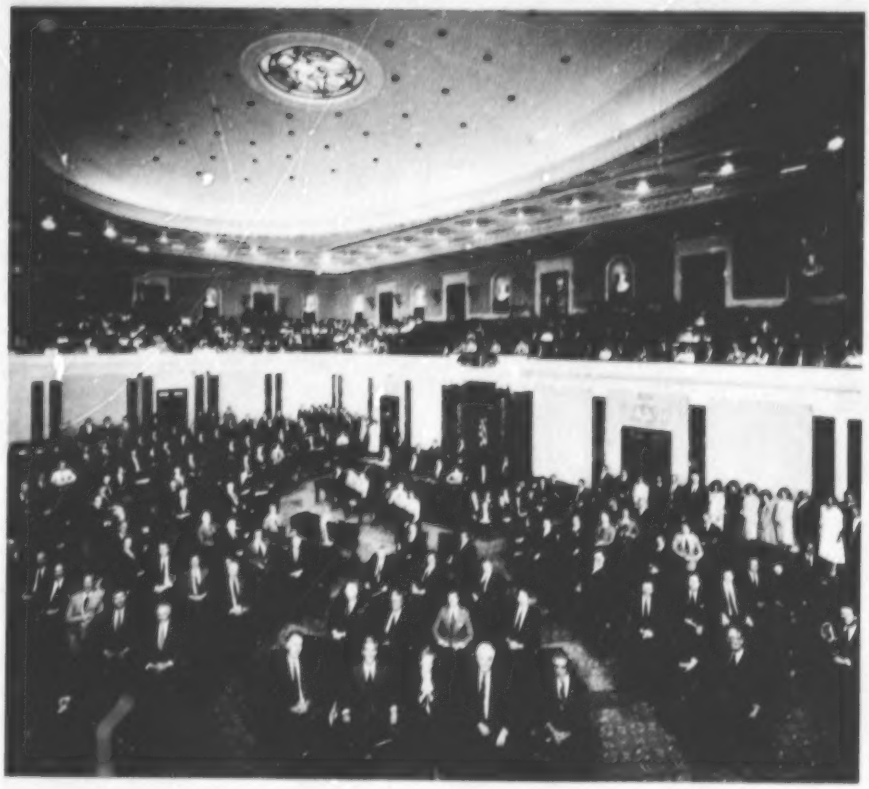
Key Aspects of the Superfund Amendments and Reauthorization Act of 1986

Members of the U.S. Senate, 99th Congress. After extensive debate, the 99th Congress passed Superfund amendments last fall.

On October 17, 1986, President Reagan signed into law a major bill reauthorizing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This reauthorization lays down the framework for CERCLA's Superfund hazardous waste cleanup program during the next five years.

A major feature of the reauthorization is its scope. From 1980 to 1985, EPA's Superfund program drew its resources from a $1.6 billion Hazardous Response Trust Fund. EPA will have more than five times that amount of money to spend on Superfund from 1986 to 1991: the size of the new Hazardous Response Trust Fund is $8.5 billion.

But the 1986 Superfund Amendments and Reauthorization Act—now commonly referred to as "SARA"—introduces many other improvements to the Superfund program. These changes, largely the result of lessons learned during the program's initial years, are certain to strengthen Superfund in the years ahead.



National Geographic Society photographer, courtesy U.S. Capitol Historical Society

Impact on Removal Actions

The 1986 reauthorization:

- Raises the limits on removal actions from six months to one year and from $1 million to $2 million; these changes were adopted in view of the actual time and cost constraints encountered during the first six years of Superfund emergency removals.
- Authorizes a waiver to the new time and cost limits if an added expenditure of time or money would be consistent with the long-term goals of a planned remedial action.
- Introduces a provision that all short-term removal actions must be designed to contribute to efficient performance of any long-term remedial action.

Impact on Remedial Actions

The 1986 reauthorization:

- Sets goals for the completion of preliminary assessments of sites on EPA's inventory of potentially hazardous sites, which lists sites that may one day qualify for ranking on Superfund's National Priorities List.
- Sets mandatory deadlines for the completion of two important types of work at National Priorities List sites: 275 remedial investigations and feasibility studies must be finished by 1989, and, even more importantly, 175 remedial actions must reach the final cleanup stage by 1989, with 200 more to follow by 1991.
- Requires that permanent remedial cleanups produce environmental results consistent with state and federal laws as well as with EPA's National Contingency Plan.
- Stipulates that EPA must consider cost-effective cleanup alternatives that foster the recycling or treatment of waste rather than land disposal.
- Mandates that hazardous waste targeted for removal to a new site should go only to sites in compliance with strict Resource Conservation and Recovery Act standards.

Tom Self

Wearing a self-contained breathing apparatus and fully encapsulating butyl rubber "moon suit," a student at EPA's Hazardous Materials Incidence Response Training Center in Cincinnati, Ohio clambers over an obstacle course. The exercise helps the wearer become accustomed to moving in the cumbersome protective gear. The Superfund amendments include an emphasis on training to improve hazardous waste cleanups.

Strengthened Enforcement Authorities

One of the major goals of Superfund enforcement has been to encourage the parties responsible for generating the problem to pay for the cleanup. SARA enhances EPA's enforcement powers by:

- Giving statutory authority to the use of settlement agreements and establishing specific procedures for reaching them. These agreements, which spell out what is required of private responsible parties to meet their legal obligations under the Superfund statute, were used extensively during the first years of the program's operation, but as a matter of Agency policy, not of law.
- Authorizing increased criminal penalties for failure to report releases of hazardous waste, and making the providing of false or misleading information a criminal offense.
- Improving EPA access to hazardous waste sites for the completion of investigations and cleanups.
- Requiring enforcement authorities to keep an administrative record of enforcement actions at National Priorities List sites.

Increased State Involvement

The first years of the Superfund program involved state governments in many decisions, but not as systematically as many officials in the states would have wished. SARA requires EPA to develop and implement regulations to assure involvement of states, including their:

- Participation in identifying National Priorities List sites.
- Review of all preliminary documents related to Superfund remedial actions, as well as final plans for the actions.
- Participation in all enforcement negotiations and concurrence in settlement agreements that EPA makes with responsible parties.
- Concurrence in the deletion of sites from the National Priorities List; that is, agreement with EPA and responsible parties that a Superfund cleanup is, in fact, complete.

Emergency Planning

Under the 1986 reauthorization:

- Each governor must appoint commissions to formulate plans for dealing with hazardous waste emergencies; mandated local planning committees must develop local emergency plans by November 1988.
- EPA must publish a list of extremely hazardous substances and write regulations establishing what quantity of each substance would have to be released before an emergency should be declared.
- Facilities that produce, use, or store extremely hazardous substances must notify the state emergency planning commission and local planning committees of their practices; they must also provide immediate notification of releases in excess of EPA-determined thresholds.

Expanded Research, Development, and Training

The 1980 Superfund law made no specific provisions for research and development or for training. SARA:

- Establishes a comprehensive and coordinated research and development program, including demonstration programs for technologies that offer alternatives to conventional methods of handling hazardous waste removals or site cleanups, especially methods that lead to the destruction or recycling of wastes.
- Calls for the establishment of training programs for hazardous substance response and research.

Stronger Citizen Rights

The Superfund program takes pride in its extremely active Community Relations Program, which was begun in 1983. There was only limited statutory provision for the program in the original 1980 Superfund law. That law also did not define citizen rights to sue for failure to meet statutory requirements.

The 1986 Superfund reauthorization:

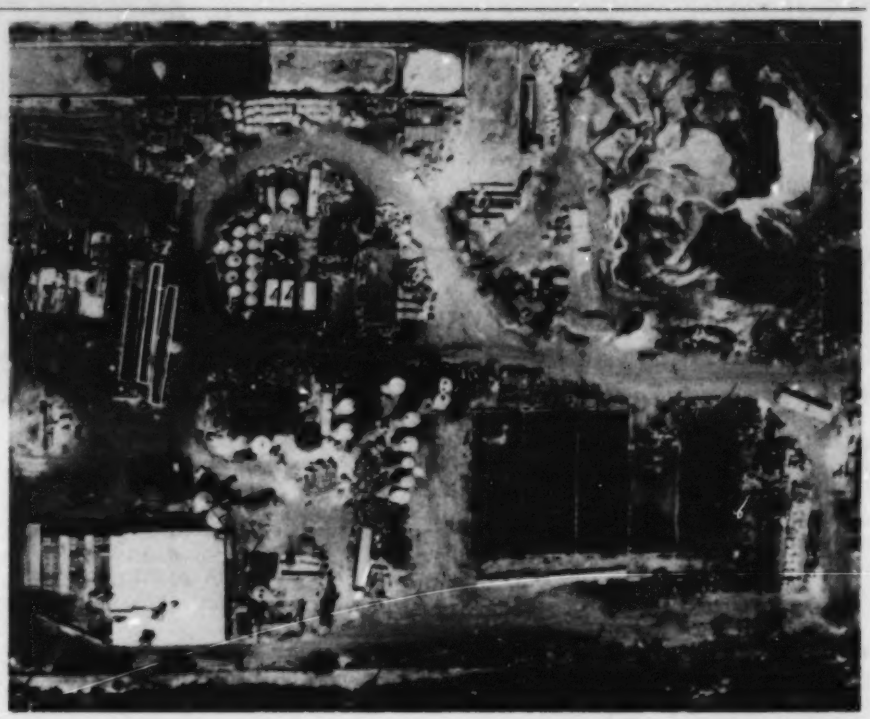
- Establishes requirements ensuring that the public can participate in the formulation of plans for Superfund actions.
- Authorizes technical assistance grants so citizens can hire experts to explain the complexities of hazardous waste problems and the Superfund program.
- Permits citizens to sue any person or any governmental entity for alleged violation of a provision of the Superfund law. □

New Enforcement Powers

"The polluter should pay." This is the guiding principle behind Superfund enforcement. It means that those parties responsible for the presence of hazardous substances at a Superfund site must either clean the site up themselves or pay for the cost of an EPA cleanup. The goal of Superfund enforcement is to encourage responsible party cleanups through settlement.

Since 1980, responsible parties have entered into 372 settlements with EPA worth $619 million in actual cleanup expenditures or cash. In addition, EPA has recovered $37 million in compensation for cleanups performed by EPA. This added 40 percent in buying power to the $1.6 billion Superfund during its first five years of operation, and represents a net return in cash or cleanup of $4 for every $1 of enforcement money expended.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) further encourage prompt settlements. They also reaffirm and strengthen the principle of responsible party liability.



EPA/EMSL/Las Vegas

Principles of Liability

Parties liable for payment of Superfund cleanup costs include companies that generated any hazardous substances found at a site, present and former owners and operators of a site, and certain transporters who disposed of hazardous substances at a site.

SARA affirms the federal government's right to use two important principles of liability, both of which will make it much easier for EPA to win enforcement cases:

- **Joint and several liability** means that parties responsible at a Superfund waste site can all be sued together or any one may be sued alone for 100 percent of cleanup costs. This liability principle gives EPA a great deal of legal leverage with violators.

- **Strict liability** is liability without a showing of fault. EPA has only to show that some of a generator's hazardous substances came to be located at the site; it does not have to establish that willful or inadvertent negligence was involved.

As for harm to the site, EPA only has to show that the harm was caused by substances similar to those of the generator. In other words, it is up to the alleged violator to prove either that its specific wastes had nothing to do with the harm, or that they caused only a discrete portion of it. In most cases, the responsible party cannot present evidence adequate to substantiate either argument.

The value of these strong liability principles is that they often force responsible parties to aggressively pursue settlement agreements as a substitute for costly and time-consuming litigation.

Innovative Enforcement Tools

Whether EPA will settle with responsible parties, rather than pursue litigation, is governed by the terms of the Interim CERCLA Settlement Policy (50 *Federal Register* 5034). This policy states that EPA prefers settlement but will file suit where necessary to protect public health and the environment. The policy also provides guidance on issues vital to settlement. SARA codifies much of the policy.

The new Superfund amendments endorse two particularly controversial procedures that figure in the Interim Settlement Policy: mixed funding and de minimis settlements.

- **Mixed Funding** occurs when monies from both Superfund and responsible parties are used at the same site. Use of mixed funding is most likely to be approved where the parties willing to settle are also willing to conduct the cleanup, and where there are financially viable nonsettlers that EPA may pursue. However, Superfund's money is not forthcoming until the cleanup is complete. Responsible parties who settle in a mixed funding agreement must pay "upfront" 100 percent of the cost of the cleanup.

Western Processing, Inc., a hazardous waste handling and disposal firm in Kent, WA. Aerial view, left, shows the site in 1982, with storage tanks, liquid waste pits and ponds, and thousands of drums. Photo above shows the site as it looks today, following a surface cleanup carried out as a result of a consent decree between EPA and nearly 200 potentially responsible parties. Last year, responsible parties signed a second consent decree to conduct a sub-surface cleanup of the site, involving excavation of buried containers and soil wastes and construction of a ground-water treatment plant.

Once the cleanup is finished and certified as properly done, EPA will reimburse the settling parties for that portion of the costs specified in the settlement agreement. The Agency, in the meantime, sues the parties that would not settle to recover for Superfund its share of the cleanup costs.

Mixed funding permits cleanups to proceed even in cases where some responsible parties, out of a whole group, refuse to settle out of court.

- **De Minimis Settlements** involve parties that contributed very small amounts of hazardous waste at a site. At some Superfund sites, responsible parties number in the hundreds. To reduce the number of parties involved, EPA can settle with the small, or de minimis, contributors as a single group.

In this way, the government achieves a more manageable case, and the de minimis parties end their involvement in the case more quickly. This saves money and manpower that might otherwise be wasted on lengthy negotiations.

- **Nonbinding Preliminary Allocations of Responsibility**, known as NBARs, are an altogether new enforcement tool, unlike mixed funding and de minimis settlements. The NBAR is an allocation by EPA of total response costs among responsible parties at a site. Congress wrote NBARs into the 1986 Superfund amendments as a discretionary tool to hasten settlement in appropriate cases.

Under current Superfund policy, responsible parties are expected to work out among themselves the exact allocation of the total cost of cleanup each must bear. In some cases this results in serious conflicts and delays. Now EPA can step in, as needed, to provide an NBAR to expedite a settlement. EPA is preparing interim guidelines for Nonbinding Preliminary Allocations of Responsibility, expected to appear for comment this spring in the *Federal Register*.

Pilot studies are now underway for mixed funding and de minimis settlements, with more expected to begin in the near future. Several pilot projects will also be conducted before NBAR procedures assume final form.

A conciliatory resolution of enforcement problems is, in the experience of Superfund, a far better strategy than the tug-of-war of never-ending litigation. EPA's quest for out-of-court settlements will be enhanced by enforcement tools that are stronger than ever. It must be emphasized, however, that settlements will never be sought where they would compromise Superfund's goals of protecting public health and the environment. □

The Quest For Alternative Technologies

When Superfund was launched seven years ago, land disposal was the most common method of handling hazardous waste. Land disposal entailed immobilizing hazardous waste in a specially prepared pit, landfill, or surface impoundment. Though cost-effective in the short run, it often led through leaks and other defects to extremely expensive long-term environmental problems.

By the time the Resource Conservation and Recovery Act was reauthorized in 1984, the climate of opinion had shifted dramatically in the direction of more permanent methods of handling hazardous waste. The Superfund Amendments and Reauthorization Act of 1986 (SARA) continues the pendulum swing in that direction.

SARA requires EPA, to the maximum extent practicable, to select remedial actions that create permanent solutions and, in doing so, to make use of alternative or resource recovery technologies. The least preferred remedial method is to transport untreated Superfund wastes to landfills.

Even before the passage of SARA, Superfund was making use of alternatives to land disposal. Thermal destruction technology has been used in approximately 13 percent of all Superfund removal actions. It is currently planned for use in approximately 10 percent of all Superfund remedial actions. Various forms of chemical and physical treatment are included in current plans for approximately nine percent of remedial actions.

Let's take a quick look at the leading technologies under consideration as alternatives to land disposal. A good way to categorize them is according to whether they destroy, immobilize, or separate the waste.

Waste Destruction Technology

"Destroying" hazardous waste means getting rid of most of it. Some harmful residues may still be left behind, however, and these must be properly disposed of.

Thermal Treatment

The most common type of thermal treatment heats waste over a flame-powered incinerator. Currently, if waste at a Superfund site is to be burned, it is usually removed from the site and taken to the incinerator. In the future, EPA will make greater use of mobile incinerators, which can be moved from one site to another as needed.

Various types of flame-free thermal treatments are now being developed to destroy hazardous waste, including fluidized bed treatment, infrared treatment, plasma arc, and pyrolysis.

Neutralization

Certain types of hazardous waste can be "neutralized." For example, an acid can be added to an excessively alkaline waste, or a base to an overly acidic waste.

Waste Immobilization Technology

Immobilizing a waste puts it into a solid form that is easier to handle and less likely to enter the surrounding environment. It is useful for dealing with wastes, such as certain metals, that cannot be destroyed. Once a waste has been immobilized, the material resulting from the immobilization process still must be properly disposed of.

Fixation and Solidification

Two popular methods of immobilizing waste are fixation and solidification. Engineers and scientists mix materials such as fly ash or cement into hazardous waste. This either "fixes" hazardous particles, in the sense of immobilizing them or making them chemically inert, or "solidifies" them into a solid mass. Solidified waste is sometimes made into solid blocks that can be stored more easily than a liquid.

Waste Separation Technology

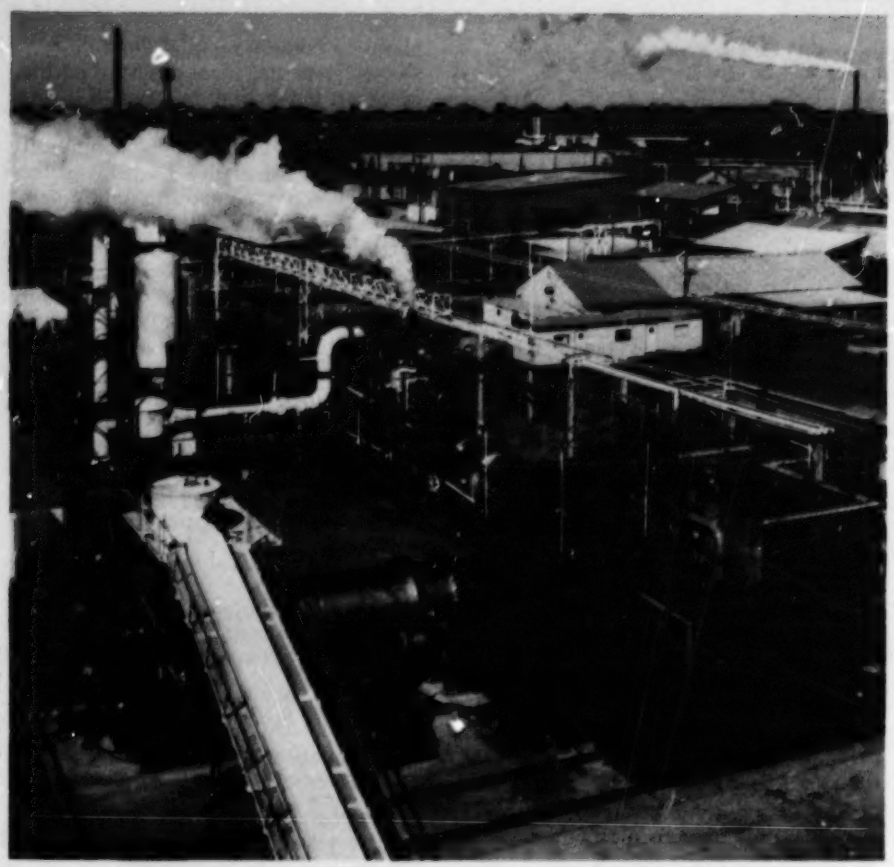
Waste separation entails either separating one hazardous waste from another, or separating hazardous waste from a non-hazardous material that it has contaminated. Sometimes this separation is achieved by changing the waste from one form (solid, liquid, gas) to another. Regardless of the way it is achieved, separation results in end-products that can be adaptable to recycling.

Air Stripping and Steam Stripping

Air stripping is sometimes used to remove volatile chemicals from water. Volatile chemicals, which have a tendency to vaporize easily, can be forced out of liquid when air passes through it. Steam stripping works on the same general principle, except that it uses heated air to raise the temperature of the liquid and force out volatile chemicals ordinary air would not.

It should be noted that the mixture of air and chemicals that results from air and steam stripping is still hazardous and must be further treated before release.

An interesting variation on this technology is now being used at the Verona Well Field site in Michigan to remove volatile organic chemicals from the soil above an aquifer. Another promising variant is landfill gas extraction, in which vacuum wells are used to remove gases from soil.



Environmental Systems Company

A modular incineration system, designed by a company in Arkansas to be mounted on moveable skids or flatbed trailers and transported to contaminated sites or waste generation facilities. More use will be made of mobile incinerators at Superfund sites in the future.

Carbon Adsorption

Carbon adsorption tanks contain particles of carbon that have been specially activated to treat hazardous chemicals in gaseous and liquid hazardous waste. The carbon chemically combines with the waste or catches hazardous particles just as a fine wire mesh catches grains of sand. Contaminated carbon must then be disposed of, or cleaned and reused.

Precipitation

Precipitation involves adding special materials to a liquid waste. These bind to hazardous chemicals and cause them to precipitate out of the liquid and form large particles called "floc." Floc that settles can be separated as sludge; floc that remains suspended can be filtered.

Soil Washing and Flushing

Soil containing easily dissolved chemicals can sometimes be cleaned by soil washing. Cleaning liquid, added at the top of a tank of contaminated soil, picks up waste as it passes through the soil. The contaminant-laden cleaning liquid must be further treated or properly disposed of.

Soil flushing works on the same principle, except that it occurs in the ground rather than in a tank. Soil is purified when cleaning liquid is passed through it; each time the liquid passes through, it is collected by pipes or wells located at the base of the contaminated area.

Removing Obstacles to Innovation

While alternative technologies may be currently available, there are often serious impediments to their use at Superfund sites. These include certain factors that EPA cannot control, such as economic and marketplace uncertainties. One major uncertainty is the degree to which the public will accept a particular means of handling hazardous waste; this has been a special problem in the case of incineration.

But there are other steps EPA can take to create a climate more receptive to alternative technologies, and the Agency is moving ahead with those.

For example, EPA is setting up a quicker and more flexible method for selecting contractors to clean up Superfund sites and to determine how Superfund wastes may be treated. The Agency's Office of Solid Waste is also working to streamline the Superfund permitting process to give high priority to issuing permits for alternative treatment technologies.

A new provision of SARA also fosters the use of alternative technologies by giving EPA the authority, under certain circumstances, to assume liability for contractor efforts to test or demonstrate alternative technologies.

In addition, a Superfund Innovative Technology Evaluation (SITE) program has been established to demonstrate new and innovative technologies. Starting in the summer of 1987, such technologies will be tested on real wastes in full-scale situations at Superfund sites.

The results of these tests will generate vital cost and performance data, making it easier for new technologies to compete in the real world. EPA has also developed a program to communicate SITE data to appropriate offices within Superfund.

What Lies Ahead

Congress, EPA, and the U.S. public are all seeking reliable long-term solutions to the problem of managing Superfund sites. Land disposal is no longer a preferred remedy, but it will take some time for alternative technologies to develop sufficient capacity to fill the gap.

During the years ahead, we can expect to see alternative technologies substituting for landfilling at an increasing number of Superfund sites. EPA is doing everything possible to hasten the day when enough safe and reliable remedies exist to ensure that Superfund cleanups are permanent. □

Title III: Emergency Planning and Community Right-To-Know

The tragedy in Bhopal, India, an event that occurred halfway around the globe, shocked the United States and the rest of the world into recognizing the enormous potential threat that exists regarding chemical accidents. It also stimulated an aggressive series of actions to develop and modify programs dealing with the prevention of and response to such accidents.

The message is clear: No matter how good the intent to mitigate chemical disasters, to deal with the causes of chemical disasters, and to control the conditions surrounding a potential chemical disaster, accidents will still happen and we must be be prepared to respond.

Events such as Bhopal, as well as the release in Chernobyl, made Americans more concerned than ever before about the need to be aware of chemicals and the hazards they pose. These events did not cause the federal government to "start" dealing with this problem, but rather to renew existing efforts with greater force and resolve.

As part of EPA's Air Toxics Strategy, announced by Administrator Lee Thomas in June 1985, the Agency developed the Chemical Emergency Preparedness Program (CEPP). CEPP provides guidance, training, and technical assistance to states and local communities to help them in preparing for and responding to chemical accidents.

Recognizing the need for better preparation to deal with chemical emergencies, Congress enacted the Superfund Amendments and Reauthorization Act of 1986 (SARA). One part of SARA is a free-standing act called Title III: The Emergency Planning and Community Right-to-Know Act of 1986.

Title III requires federal, state, and local governments and industry to work together in developing emergency plans and "community right-to-know" reporting on hazardous chemicals. These requirements build upon EPA's Chemical Emergency Preparedness Program and numerous state and local programs aimed at helping communities deal with potential chemical emergencies. The community right-to-know provisions will allow the public to obtain information about the presence of hazardous chemicals in their communities and releases of these chemicals into the environment.

Title III has four major sections: emergency planning, emergency notification, community right-to-know reporting requirements, and toxic chemical release reporting (emissions inventory).

Emergency Planning

The emergency planning sections of Title III are designed to help state and local governments develop emergency response and preparedness capabilities through better coordination and planning, especially within the local community.

Title III requires the governor of each state to designate a state emergency response commission. If a state commission is not designated, the governor will operate as the commission until that designation is made. This state commission should represent state organizations and agencies with expertise in emergency response, such as state environmental, emergency management, and public health agencies. Various public and private sector groups and associations with interest and expertise in Title III issues can also be included in the state commission.

The state commission must designate local emergency planning districts (which can be based on existing municipalities) and appoint local emergency planning committees within a month after districts are designated. The state commission supervises and coordinates the activities of the local emergency planning committees, establishes procedures on how to handle requests for information, and reviews local emergency plans.

In a somewhat unprecedented requirement, each local emergency planning committee must include elected state and local officials; police, fire, civil defense, public health professionals; environmental, hospital, and transportation officials; community groups; and the media. Facilities subject to the emergency planning requirements must also be represented on the local committee. The local committee must establish rules, give public notice of its activities, and establish procedures for handling public requests for information.

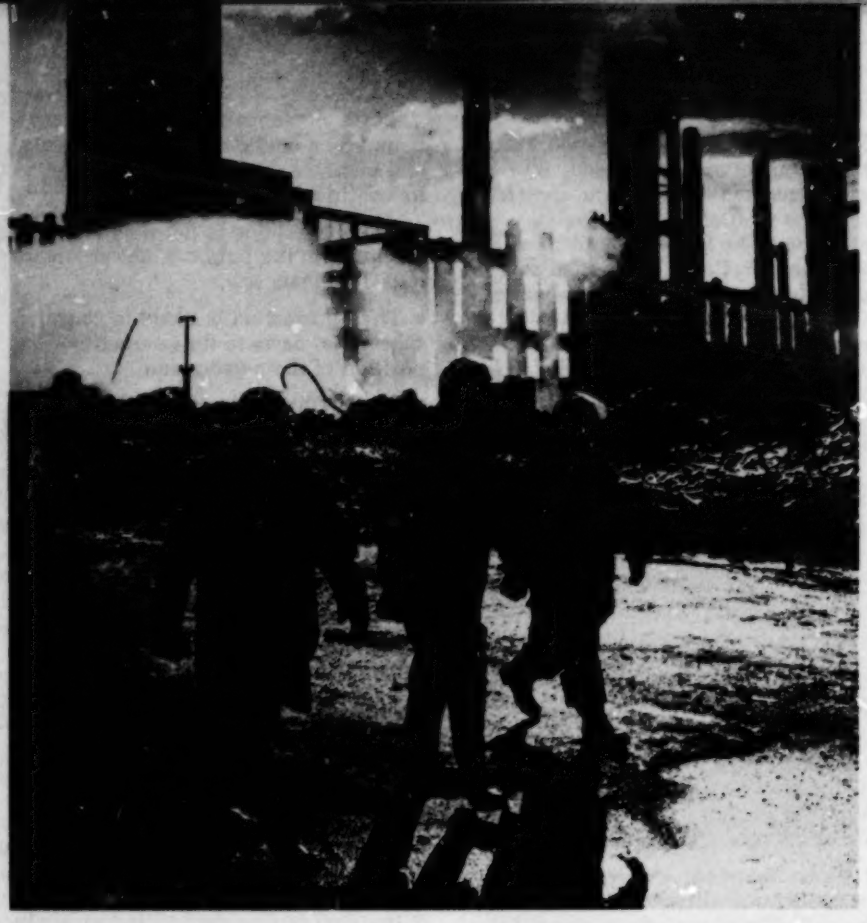
A local committee's primary responsibility will be to develop an emergency response plan by the fall of 1988. In developing this plan, the local committee will evaluate available resources for preparing for and responding to a potential chemical accident.

The plan must:

- Identify facilities as well as transportation routes for extremely hazardous substances.
- Establish emergency response procedures, both on-site and off-site.
- Formulate emergency notification procedures and evacuation plans.
- Establish methods for determining when releases occur and what areas and populations may be affected.
- Describe community and industry emergency equipment and facilities, and who is responsible for them.
- Describe and schedule a training program to teach methods for responding to chemical emergencies.
- Establish methods and schedules for exercises to test emergency response plans.
- Designate a community coordinator and a facility coordinator to implement the plan.

The emergency response plan must be reviewed by the state commission and annually by the local committee. Regional Response Teams (RRTs) may review plans and provide assistance to the local committees upon request. RRTs are composed of regional personnel from 14 federal agencies as well as state representatives with emergency responsibilities.

Guidance is also available to help the local committees prepare and review plans. The principal guidance document, "Hazardous Materials Emergency Planning Guide," will be published shortly and made available to state and local emergency officials.



George Rizer, The Boston Globe

Firefighters walk past rubble of burned out mills in Fall River, MA. About 700 people were evacuated during the January fire due to reports that toxic chemicals were stored in one of the blazing buildings. Often first on the scene in chemical emergencies, fire departments will join local committees responsible for emergency planning.

Local committees and facilities should focus their planning activities around a list of 402 extremely hazardous substances identified by EPA. The list includes the threshold planning quantities for each substance. Any facility that produces, uses, or stores more of a listed chemical than this threshold planning quantity must meet all emergency planning requirements. Also, after public comment, the state commission or the governor can designate additional facilities as subject to those requirements.

Facilities are required to notify the state commissions that they are covered by Title III emergency planning requirements. If a facility begins to produce, use, or store any of the extremely hazardous substances in threshold quantity amounts, it must notify the state commission within 60 days.

Each state commission must notify EPA of all covered facilities and facilities designated by the state commission or the governor. The state commission is also responsible for supervising the activities of the local committees.

Emergency Notification

Facilities where a listed hazardous substance is produced, used, or stored must immediately notify the local emergency planning committee and the state emergency response commission if there is a release of these substances. The substances include the 402 extremely hazardous substances on the list prepared by the Chemical Emergency Preparedness Program and substances subject to the reportable quantities requirements of the original Superfund.

The initial notification can be by telephone, radio, or in person. Emergency notification requirements involving transportation incidents can be satisfied by dialing 911, or calling the operator.

Notification of an emergency must include:

- The name of the chemical.
- Whether it is known to be acutely toxic.
- An estimate of the quantity released into the environment.
- The time and duration of the release.
- Where the chemical was released (air, water, land).
- Known health risks and necessary medical attention.
- Proper precautions, such as evacuation.
- The name and telephone number of the contact person at the facility where the release occurred.

A follow-up written emergency notice is required as soon as practicable after the release. This notice should:

- Update initial information.
- Provide additional information on response actions already taken, known or anticipated health risks, and advice on medical attention.

The requirement to notify went into effect when the Title III legislation was signed in October of 1986. Until state commissions and local committees are formed, releases should be reported to appropriate state and local officials.

Community Right-to-Know Reporting Requirements

In order to provide communities with information about chemicals and the potential hazards they pose, Congress included two community right-to-know reporting requirements in Title III.

First, facilities required to prepare or have available Material Safety Data Sheets (MSDS) under the regulations of the Occupational Safety and Health Administration must now submit copies of the MSDS or a list of MSDS chemicals to the local emergency planning committee, the state emergency response commission, and the local fire department.

If a list is submitted, the facility must submit the MSDS for any chemical on the list upon the request of the local planning committee. For this requirement, EPA may establish threshold quantities for hazardous chemicals below which no facility must report.

The second community right-to-know reporting requirement under Title III stipulates that facilities must submit an emergency and hazardous chemical

inventory form to the local emergency planning committee, the state emergency response commission, and the local fire department. The hazardous chemicals are the same as those for which facilities are required to submit MSDS or a list of MSDS chemicals under the first reporting requirement. Again, EPA may establish threshold quantities for hazardous chemicals below which no facility must be subject to this requirement.

The form must present:

- An estimate (in ranges) of the maximum amount of covered chemicals present at the facility at any time during the preceding calendar year.
- An estimate (in ranges) of the average daily amount of covered chemicals present.
- The general location of covered hazardous chemicals.

In addition to the information listed above, a local committee, state commission, or local fire department can also request a facility to provide the following information for each covered substance:

- An estimate (in ranges) of the maximum amount of the chemical present at any time during the preceding calendar year.
- A brief description of the manner of storage of the chemical.
- The specific location of the chemical at the facility.
- An indication of whether the owner will withhold location information from the public.

Toxic Chemical Release Reporting

Another section of Title III requires EPA to develop an inventory of toxic chemical releases from certain facilities. Facilities subject to this reporting requirement must complete a toxic chemical release form for specified chemicals, which must be submitted to EPA as well as to state officials designated by each governor.

This reporting requirement will inform government officials and the public about releases of toxic chemicals in the environment. It will also assist in research and the development of regulations, guidelines, and standards.

The reporting requirement applies to owners and operators of facilities that have 10 or more full-time employees, that are in Standard Industries Classification Codes 20 through 39, and that manufactured, processed, or otherwise used a listed toxic chemical in excess of specified threshold quantities. The Standard Industrial Classification Codes mentioned cover basically all manufacturing industries.

The list of toxic chemicals subject to reporting consists initially of more than 300 chemicals and categories listed for similar reporting purposes by the States of New Jersey and Maryland, but EPA can modify the list.

EPA is required to publish a "format" for the Toxic Chemical Release form, which must include the following information:

- Name, location, and type of business.
- A certification by a senior official that the report is complete and accurate.
- Whether the chemical is manufactured, processed, or otherwise used, and its general categories of use.
- Estimate (in ranges) of the maximum amounts of the toxic chemical present at the facility at any time during the preceding year.
- Waste treatment and disposal methods for dealing with the chemical, and the efficiency of the methods for each waste stream.
- The quantity of the chemical entering the environment annually.

EPA will use these data to maintain a national toxic chemical inventory. The public will be provided access to the inventory by means of computer tele-communications.

Other Title III Provisions

Title III also addresses business concerns about trade secrets as these are affected by the community right-to-know and toxic chemical release reporting requirements of the statute.

Facilities (or individuals) may, for certain reasons, withhold the specific chemical identity of an extremely hazardous substance or toxic chemical. Even if the chemical identity is withheld, however, the generic class or category of the chemical must be provided.

Title III is strict about verifying that real trade secrets do exist. The withholder must verify each of the following:

- The information has not been disclosed to any person other than a member of the local planning committee, a government official, an employee of such person, or someone bound by a confidentiality agreement, and measures have been taken to protect its confidentiality,
- The information is not required to be disclosed to the public under any other federal or state law,
- The information is likely to cause substantial harm to the competitive position of the person, and
- The chemical identity could not reasonably be discovered by anyone in the absence of disclosure.

However, even if information is legally withheld from the public, Title III states that it cannot be withheld from health professionals or officials who need it. In these cases, the person receiving the information must be willing to sign a confidentiality agreement with the firm.

EPA must publish regulations governing trade secret claims. The regulations will cover how to submit claims, petitions for disclosure, and a review process for these petitions.

All federal emergency training programs must now emphasize hazardous chemicals. Under Title III, the Federal Emergency Management Agency is authorized to provide training grants to support state and local governments. These training grants are designed to improve emergency planning, preparedness, mitigation, response, and recovery capabilities.

Under Title III, EPA has begun a review of emergency systems for monitoring, detecting, and preventing releases of extremely hazardous substances at representative facilities that produce, use, or store these substances. Representative substances to be used in the review will be selected from the same list of extremely hazardous substances used in the emergency planning provision.

Working Together

Title III constitutes a comprehensive mandate for emergency planning and ensures that citizens will have the information they need to understand and deal with chemicals in their communities. It is the responsibility of all sectors of society, public and private, to work together to prevent, prepare for, and respond to the potential hazards that chemicals pose to society. It is this cooperative spirit that can effectively assist communities in meeting their responsibilities to protect the safety of their citizens. Only through cooperation can the spirit and intent of this legislation be achieved. □

The Leaking Underground Storage Tank Trust Fund

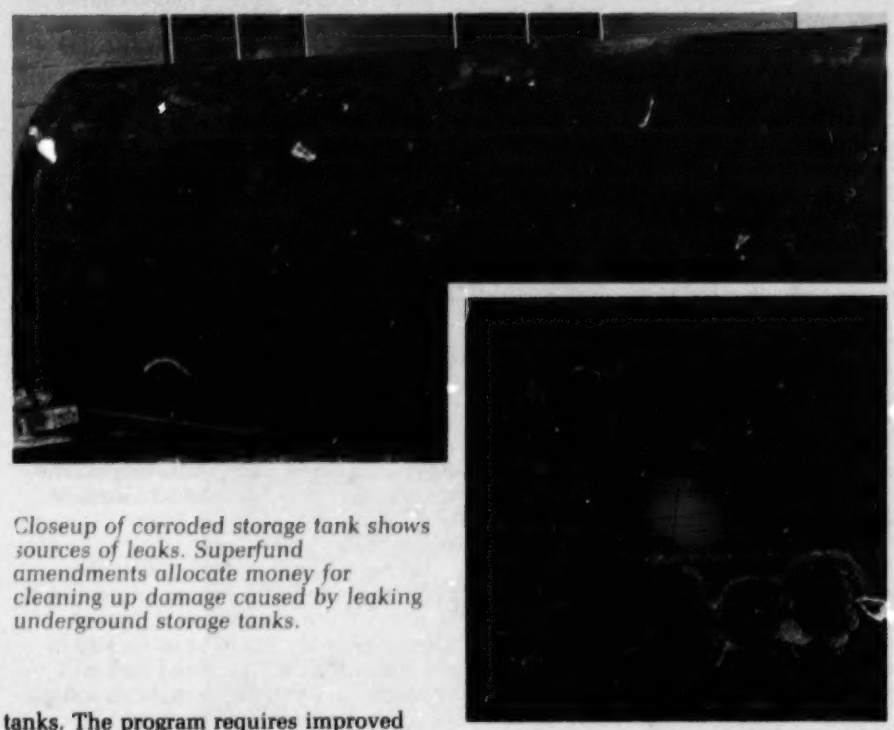
A gas station explodes in Council Bluffs, Iowa; a shopping center is shut down for more than a week in Durham, NC; more than a thousand people are evacuated in the pre-dawn hours from their homes in Claymont, DE; and throughout the country, hundreds of drinking water wells are contaminated.

These pollution episodes have not received the national attention of Love Canal, Times Beach, the Stringfellow Acid Pits, and other Superfund sites around the United States. They are not the result of careless disposal of hazardous chemicals. Their source is much more commonplace and widespread: it is gasoline from leaking underground storage tanks. LUST, one of the funniest acronyms in the environmental business, is no joke.

Last fall when Congress amended and reauthorized the Superfund law, it also changed part of the federal law dealing with underground tanks. It amended Subtitle I of the Resource Conservation and Recovery Act, or RCRA, to provide a $500 million Leaking Underground Storage Tank Trust Fund over the next five years to clean up leaks from underground petroleum storage tanks. These funds will come from a 1/10 of a cent federal tax on certain petroleum products, primarily motor fuels.

Congress passed this law because the Superfund statute excludes petroleum releases from its jurisdiction. Thus, EPA is essentially precluded from using Superfund to clean up leaks of petroleum products. With these new amendments to RCRA, however, Congress not only gives EPA and the states the authority to respond to such releases, but also provides funds to clean up the environment.

What prompted Congress to take the action it did to institute such a fund? Concern was growing over the increasing number of incidents where gasoline vapors were detected in houses and where drinking water was contaminated by leaking petroleum tanks. Late in 1984, Congress created a program to regulate underground storage tanks. The program requires improved design standards for tanks, leak detection devices, and cleanup standards.



Closeup of corroded storage tank shows sources of leaks. Superfund amendments allocate money for cleaning up damage caused by leaking underground storage tanks.

The estimated number of underground storage tanks that will be regulated by the federal government is at least one million. Based on an EPA study, the Agency estimates that 20 percent of them may be leaking; that's 200,000 leaking tanks. If only five percent of them are leaking, which EPA considers a conservative estimate, that's still 50,000 leaking tanks.

Since half the population of the United States depends on ground water as a source of drinking water, Congress chose to take positive steps to provide EPA with both the authority and the money to protect the public from releases from underground tanks.

As noted above, this new Leaking Underground Storage Tank, or LUST, Trust Fund is to be used by EPA and the states in responding to and cleaning up releases from underground tanks storing petroleum. This includes products such as gasoline, diesel fuel, and jet fuel. Releases of hazardous chemicals will continue to be addressed under Superfund, as they have been in the past.

The new law gives EPA, and states that enter into cooperative agreements with EPA, the authority to issue orders requiring owners and operators of underground storage tanks to undertake corrective action where a leak is suspected. This corrective action could include testing tanks to confirm the presence of a leak, excavating the site to determine the exact nature and extent of contamination, and cleaning contaminated soil and water. It may also include providing an alternative water supply to affected residences, or temporary or permanent relocation of residents.

The Congressional philosophy is that this authority to issue corrective action orders should be used as the primary

tool to encourage tank owners and operators to clean up releases from their tanks. Recognizing, however, that many leaking tanks will be discovered where there is no owner or operator who can afford to pay for the cleanup, or where the owner or operator lacks the willingness or ability to undertake such a project, Congress provided that monies from the Fund could be used by EPA and the states to conduct cleanups where immediate action is necessary.

The Fund is not a bailout for tank owners. Where Fund monies are used, owners and operators of underground storage tanks, as well as any other responsible parties, are still liable to EPA or the state for the costs incurred. They will be pursued in court to recover cost. And if a government agency undertakes a cleanup at a site, it's probably going to cost a lot more than if the owner had agreed to sponsor it.

Ideally, Congress believes that payment of cleanup costs can be satisfied by pollution liability insurance maintained by tank owners and operators. Reflecting this attitude, Congress has directed EPA to publish regulations requiring all tank owners and operators, including those owning chemical tanks, to maintain the financial capability to clean up leaks. For petroleum production, refining, and marketing facilities, Congress has set minimum coverage levels at $1 million per occurrence. EPA is authorized to set lower limits for facilities that don't handle large quantities of petroleum.

States may enter into cooperative agreements with EPA under this program. Doing so will not only allow states to exercise the enforcement authority granted by Congress under the statute, but most importantly, it will allow the states access to the Trust Fund to pay for site cleanups as well as certain administrative expenses related to cleanups.

EPA sees this provision of the new law as being most critical. It is the states and local governments, not EPA, that are currently in the best position to respond to releases from leaking underground petroleum storage tanks. Most states and local governments have been responding to such releases for many years.

The sheer number of underground storage tanks that are leaking or will leak in coming years demands that we avoid the typical EPA approach where the Agency develops a strong federal program, runs it for a period of time, and then turns it over to the states. Past experience demonstrates that such an approach is not necessarily the most effective way to get the job done.

Instead, EPA plans to delegate this program to the states as soon as possible, using cooperative agreements, even before full EPA approval of a state's regulatory program for underground tanks under Subtitle I of RCRA. States are the key to successful LUST Trust Fund implementation.

Since October 1986, when Congress amended Subtitle I, EPA has been putting a program in place to conduct emergency cleanups with Trust Fund monies and to give states access to the Fund. The Agency asked governors to designate a state agency for implementing and administering the program. Most have done so. EPA also provided guidelines to its 10 regional offices on how to negotiate cooperative agreements. EPA hopes to have the first agreements in place by the spring of 1987.

The aim is to use the LUST Trust Fund to clean up dangerous sites quickly. EPA envisions states using the Fund in many ways: to enforce cleanups, establish priorities for sites, determine appropriate technologies, and, most importantly, to conduct cleanups and pursue cost recovery from responsible parties.

In true emergencies, of course, the regional staff of EPA is also prepared to respond. For the most part, however, EPA expects its role to be as backup to the states. EPA's Trust Fund staff will be small, and will concentrate on setting program direction, making sure information on the best technology is available to those who need it, allocating funds efficiently, and evaluating the program's effectiveness.

A comprehensive program for dealing with the problems of underground tanks can only be accomplished through rigorous action by the states, with equally rigorous support from EPA. The LUST Trust Fund is an important tool in this country's effort to solve the health and environmental problems caused by leaking tanks. □

Taking Up the Slack: Mini-Superfunds in the States

The national Superfund program can only deal with the tip of the hazardous waste iceberg. By January 1987, 952 of the worst sites in the United States had either been listed on EPA's National Priorities List or proposed for listing. These comprise just over 10 percent of the 7900 sites where, in a recent survey of 45 states, there was known to have been a release of oil or hazardous substances.

Clearly, there is a major role for the states to play in the war on hazardous waste. How well have state governments responded to the challenge?

A recent survey conducted by the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) reveals substantial progress at the state level of government. Ninety percent of the 50 states responded to the survey. The non-respondents—Alaska, Hawaii, Nevada, Idaho, and Louisiana—have a smaller number of National Priorities List sites than the national average per state.

Thirty-six out of the 45 states responding to the ASTSWMO survey (82 percent) have passed laws that authorize the state to conduct assessments and cleanups at hazardous waste sites that threaten public health or the environment. But other numbers belie the notion that a strong state presence is already a reality.

Eleven states reported that they had no money available to fund contractors to perform site assessments and remedial actions. Nine of the other 34 states responding to the survey had funding only in the $75,000 to $500,000 range, and six of those indicated that funds for contractors were only available for emergency removals. The same was true of two other states with funds in excess of $500,000.

These data indicate that nearly half of the 45 states responding to ASTSWMO's survey need to expand a great deal before they can be said to have full-fledged hazardous waste cleanup programs.

Even those states that have more funds available for cleanup still have a long way to go before they catch up with EPA's Superfund, which had $1.6 billion in authorized spending during its first five years, and has $8.5 billion projected for its second. In contrast, the 20 states that reported expenditures for cleanup programs had average operating budgets, subject to cost recovery from responsible parties, of only $1,652,000 a year.

At present, the average state responding to the ASTSWMO survey has 18 sites on EPA's National Priorities List (NPL), 165 confirmed problem sites that do not appear on the NPL, as well as an additional 572 suspected sites. EPA can help with cleanups at NPL sites, as do the states themselves, in many cases. But only the states can ensure that sites not severe enough to merit NPL ranking receive the attention they deserve.

A problem of massive scale is taking shape, and its dimensions grow more formidable all the time. The ASTSWMO survey estimates that an average of eight new confirmed or suspected sites are reported every month. Roughly 10 percent of the total number of confirmed sites currently prove serious enough to qualify for the National Priorities List.

Rapid expansions in state hiring will be needed for the remainder of the 1980s to keep pace with the growing dimensions of the hazardous waste problem. Staffing levels are expected to rise an average of almost 100 percent by 1990, but even an increase that hefty will leave the ratio of staff to confirmed sites virtually unchanged.

This could present problems because the present ratio is already seriously deficient in some states. For example, six of the 45 survey respondents currently have no full-time equivalent staff to deal with hazardous waste cleanups or emergency actions. The average state has the equivalent of 26 full-time employees.

New Jersey Governor Thomas Kean, second from left, and State Economic and Development Authority Commissioner James Hughes, in hard hat, join other officials in breaking ground for the Seaport Industrial Park Complex in Elizabeth, NJ. The complex will be built on the old Singer property, a 106-acre site where sewing machines were manufactured for more than a century. Under New Jersey's Environmental Cleanup Responsibility Act, contaminated property must be cleaned up before sale. Singer spent $1.2 million to remove PCBs from soil and floor surfaces at this site.

Despite funding and manpower constraints, levels of efficiency in state mini-Superfunds are quite respectable. One yardstick widely used to measure performance is the length of time a site cleanup requires. The states have estimated that state-funded cleanups require an average of 4.73 calendar years from start to finish. This compares with 3.67 years for cleanups paid for by responsible parties, and 5.54 years for EPA-managed cleanups under the national Superfund program.

Why are state cleanups faster than federal cleanups? EPA's Superfund program must deal with the worst sites in the United States: sites that present massive and intractable problems even to the well-funded manager, scientist, and engineer. Bill Child, Director of the Division of Land Pollution Control at Illinois' environmental agency, also credits some of the states' speed to simpler paperwork requirements.

But even with simpler sites to deal with, and less complicated bureaucratic procedures, the states have found, as EPA had already, that it is extremely difficult to complete a cleanup at a hazardous waste site. To date, only 5.5

percent of remedial actions have been completed at confirmed sites in the 45 states surveyed, and that figure includes cleanups funded and managed by EPA.

The difficulty and the expense of cleaning hazardous waste sites are readily apparent to state government officials and taxpayers. Fundamental principles of fairness dictate that the party responsible for creating the waste in the first place should also bear the burden of cleaning it up.

As a result, most state laws that have set up mini-Superfunds follow the basic principle behind EPA's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA insists that wherever a solvent private party can be proved responsible for a hazardous waste problem, that party should both fund and complete the site cleanup required.

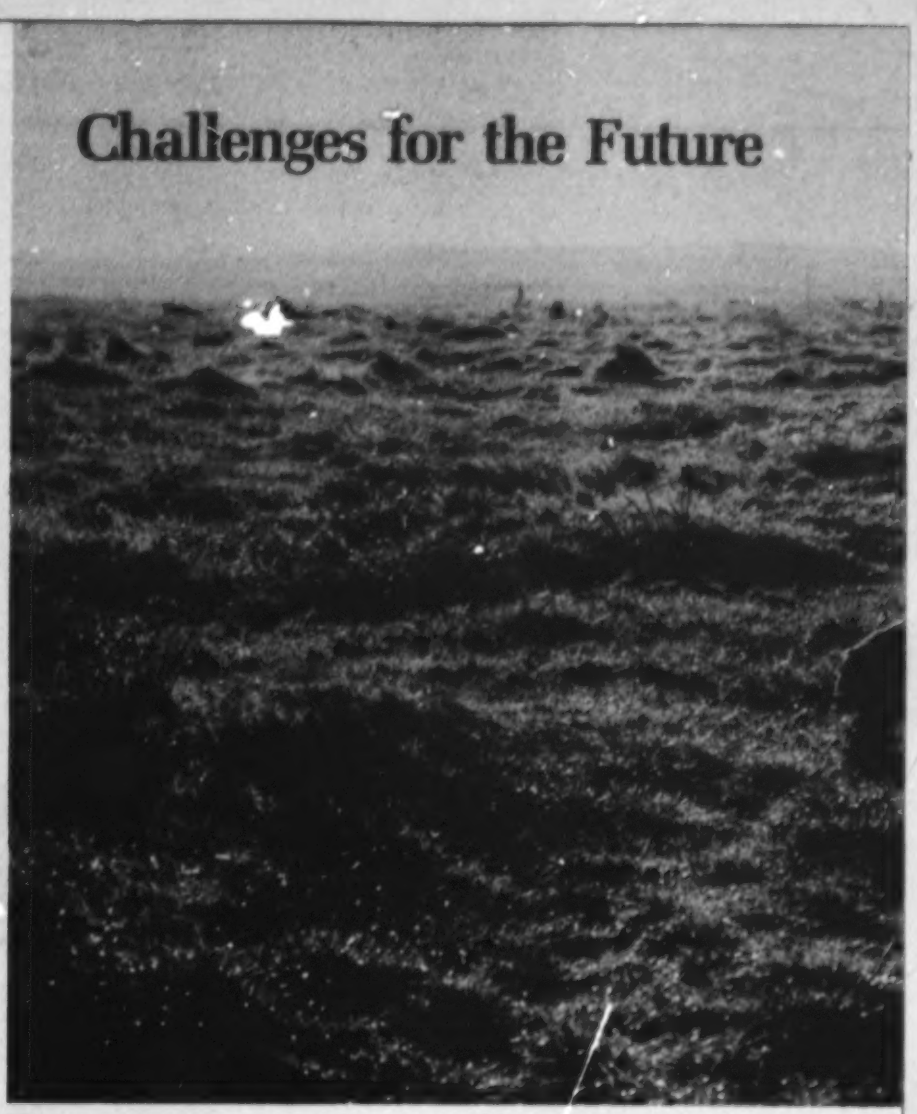
State governments are taking the same route: 74 percent of the respondents to the ASTSWMO survey have statutes that can require responsible parties to clean up the damage they have inflicted on the environment.

A new enforcement tool is becoming a useful weapon in a growing number of states. Several states have recently passed laws prohibiting the sale of real estate contaminated with hazardous waste. New Jersey's Environmental Cleanup Responsibility Act, the best-known of these laws, requires the complete restoration of a contaminated site prior to its transfer to another party.

Businesses eager to turn a profit on valuable pieces of property now have every incentive to invest in a cleanup; the penalty for not doing so is to experience a freeze-out on the real-estate market. Legislative analysts predict that legal restrictions of this kind will become even more popular as a state enforcement tool in the next few years.

The emergence of mini-Superfunds in the states is an extremely promising development. EPA's Superfund program can only deal with the very worst hazardous waste sites. But sites presenting an intermediate level of hazard also demand attention, and responsible private parties are not always willing or able to assume the burden. Thus, a large part of the cleanup burden falls on the shoulders of state governments, many of which clearly have a great need for more resources if they are to succeed. States that have not yet begun gearing up to fight the war against hazardous waste need to emulate those that have. □

Challenges for the Future



EPA action to implement Superfund helps to protect the land for all citizens.

The next five years present EPA and the nation with a complex set of challenges:

Speeded-Up Pace of Superfund Cleanups

The Superfund Amendments and Reauthorization Act of 1986 (SARA) gave EPA some very difficult deadlines. The Agency has until 1989 to complete 275 remedial investigations and feasibility studies. By the same year, EPA must have 175 remedial actions in the final cleanup stage. Two hundred more must have reached that stage by 1991.

Even with the quintupling of Superfund from $1.6 to $8.5 billion, the managerial and technical challenge will be intense. Fortunately, the Agency has already completed a great deal of the preliminary work that will put an accelerated pace of cleanup completions within reach.

More Permanent Cleanup Remedies

"More permanent" remedies are not necessarily slower or more expensive remedies. But some major readjustments in thinking will be necessary. It is no longer possible to fall back on some of the "solutions" of the past, for example, excessive reliance on landfills.

Intensified Research and Development

There are bound to be frustrations and delays until alternative technologies can handle all the waste no longer earmarked for land disposal. That is why EPA regards research and development geared to alternative technologies as an important challenge in the years ahead.

Improved Management

Without streamlined management, EPA will be unable to meet its statutory deadlines, or to make those deadlines stick by implementing permanent cleanup remedies. The vastly increased scale of the new Superfund—five times larger than in the first five years—will impose managerial burdens of its own.

To ensure that the money goes for cleanups, not for overhead, Superfund plans to introduce a project management approach to cleanups. This will centralize managerial control for each individual cleanup under the authority of a single management organization. Centralized control will minimize transition time and expedite work on Superfund projects, while at the same time improving its quality.

Another managerial goal for Superfund is improved coordination with EPA programs authorized by the the Resource Conservation and Recovery Act. Both Superfund and RCRA are managed by EPA's Office of Solid Waste and Emergency Response.

Strong Enforcement

Enforcement has always been a major challenge of Superfund because of the unique nature of the CERCLA statute. In 1980, Congress decreed that responsible parties should, wherever possible, be identified and held responsible for cleanups at Superfund sites.

Currently, settlement agreements and cost-recovery lawsuits have netted $657 million for Superfund. The next five years promise to yield even better results.

Greater Involvement by State Governments

SARA also involves state governments in Superfund decision-making to a greater extent than ever before. The states must now be involved in the entire process from site identification to cleanup, including negotiations, and EPA must develop regulations to assure this involvement.

Continued Emphasis on Community Involvement

EPA established an aggressive community relations program for Superfund in 1983. Congress has now mandated an even more active role for the public in the Superfund decision-making process.

Two other initiatives will also be major challenges of EPA's Office of Solid Waste and Emergency Response in the years ahead:

Improved Emergency Planning

Title III legislation appended to SARA will lead to better preparation at the state and local levels of government for emergencies related to hazardous waste. The community right-to-know provisions of this statute reinforce Superfund's commitment to citizen rights by allowing the public to obtain information on the hazardous chemicals in its communities.

The Leaking Underground Storage Tank Trust Fund

The establishment of a Leaking Underground Storage Tank Trust Fund gives EPA's Resource Conservation and Recovery Act program funds to address the problem of petroleum pollution resulting from defective storage tanks. The LUST Trust Fund will provide $500 million over the next five years to clean up eligible sites contaminated by leaks from underground storage tanks.

The future of hazardous waste management and cleanup is a challenge that can and will be met. EPA's Superfund program has built up a sizable reservoir of knowledge in its first six years. And a great deal of preliminary work was completed during those years that can now be brought to bear as we finish cleanups. These factors should help make it possible for the Superfund program to successfully meet the complex range of new challenges that loom ahead. □

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